REMARKS

Claims 1-5 and 7-10 were pending in this application. By this amendment, Applicants have amended Claims 1-4 and 7 to more distinctly claim and more particularly point out the subject matter of the invention.

Examiner Interview

On September 12, 2007, attorneys for Applicants conducted a telephone interview with Examiner Jose A. Fortuna. The present rejections based upon 35 U.S.C. §103 and references such as Brink et al., U.S. Patent No. 3,639,111, were discussed. No agreement was reached. The Examiner's time is most appreciated.

35 U.S.C. § 112 Rejections

Claims 1-10 have been rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In view of the amendment to Claim 1 above, Applicants respectfully request the Examiner reconsider and withdraw the rejections.

35 U.S.C. § 103 Rejections

Claims 1-10 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Brink et al., U.S. Patent No. 3,639,111 ("Brink") in view of Hess et al., U.S. Patent No. 3,607,619 ("Hess"). With respect to Claim 1, the Examiner maintains that Brink discloses a method for treatment of spent liquor in order to recover its contents of chemicals and energy, wherein a spent liquor flow arriving from the evaporation plant is taken to a pyrolysis reactor, wherein it is pyrolyzed at a temperature of about 400°C to 750°C, which contains two specific points within the claimed range of 300-800°C, and the coke is taken to a gasification reactor for gasification, which gasification is implemented under such conditions that the sulphur compounds contained in the coke and deriving from the cooking chemicals are reduced to sodium sulphide. The Examiner

construes that Brink's lack of discussion of adding oxygen in the first zone to mean that the pyrolysis in the first zone occurs in the absence of an external gas compound and that Brink does not suggest introducing oxygen until the temperature is to be increased to the 800-1200°C range, which occurs in the second zone. The Examiner maintains that at the time of the invention, it would have been obvious to one of ordinary skill in the art to understand that the process occurs at a pulp mill since the black liquor is derived from the Kraft process in the pulping of wood.

The Examiner notes that Brink does not disclose expressly that the evaporable compounds are recovered before gasification, but the Examiner maintains that Hess discloses a method for treatment of spent black liquor at a pulp mill wherein a spent liquor flow arriving from the evaporation plant is taken to a pyrolysis reactor, wherein it is pyrolyzed at a temperature of 450-700°C, which contains one specific point within the claimed range of 300-800°C, in the absence of an external gas component in order to separate evaporable compounds from the coke remaining in a solid state, whereupon the evaporable compounds are recovered and the coke is burned to supply heat and to recover chemicals. The Examiner maintains that at the time of this invention, it would have been obvious to a person of ordinary skill in the art to recover gases produced by pyrolysis as described by Hess in the pyrolysis and gasification process of Brink to obtain the invention as specified in Claim 1. The Examiner further maintains that the motivation would have been that that gaseous products of the process contain a substantial amount of dimethyl sulfide, which may be recovered as a valuable by-product of the process.

Claim 2 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Brink and Hess as applied to Claim 1, and further in view of Dehaas, U.S. Patent No. 4,135,968 ("Dehaas"). The Examiner states that Brink and Hess do not disclose expressly that part of the liquor is burnt in a soda recovery boiler, but Dehaas discloses that a part of the spent liquor flow arriving from the evaporation plant is taken to the pyrolysis reactor, whereas a second part of the spent liquor flow is taken to a soda recovery boiler where it is burnt in order to recover its contents of chemicals and energy. The Examiner maintains

that at the time of the invention, it would have been obvious to a person of ordinary skill in the art to divide concentrated spent liquor for treatment by pyrolysis or by burning in a recovery boiler as described by Dehaas in the pyrolysis and gasification process of Brink and Hess to obtain the invention as specified in Claim 2.

Claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Brink and Hess as applied to claim 1 and further in view of Purdy et al., U.S. Patent No. 4,497,637 ("Purdy") and Hermescec et al., U.S. Patent No. 6,596,908 ("Hermescec"). The Examiner maintains that with respect to Claim 10, Brink and Hess do not disclose expressly producing pyrolysis oil, however, Brink discloses that the process is adapted to various organic wastes comprising wood, bark, agricultural residues, and municipal sanitary and solid wastes including garbage in addition to Kraft black liquor. The Examiner further maintains that Purdy discloses a method of pyrolyzing a biomass with inert gases, including char, pyrolysis oil, and pyrolysis gas, and gasifying the char at a temperature of 900-1600°F, which contains one specific point within the claimed range of 300-800°C. The Examiner notes that Purdy does not disclose expressly that pyrolysis oil is the main constituent of the evaporable compounds, however, the Examiner maintains that Hermescec discloses a method of pyrolyzing lignocellulosic material, discloses that the relative product yield depends on process parameters and that pyrolysis oil is the major product at temperatures between 350 and 600°C. The Examiner maintains that at the time of the invention, it would have been obvious to a person of ordinary skill in the art to expect pyrolysis gas production as described by Purdy and Hermescec in the pyrolysis and gasification process of Brink and Hess to obtain the invention as specified in Claim 10.

The Examiner further rejected Claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Tournier et al., U.S. Patent No. 4,511,433 ("Tournier") in view of Gessner G. Hawley, The Condensed Chemical Dictionary, Tenth Edition, Van Nostrand Reinhold Co., 1981 ("Hawley"). With respect to Claim 6, the Examiner maintains that Tournier discloses a method for treatment of spent liquor in which cooking is carried out

with an organic solvent in order to recover its contents of chemicals and energy, wherein the spent liquor flow arriving from distillation is taken to a pyrolysis reactor, wherein it is pyrolyzed at a temperature of 450°C, which contains one specific point in the claimed range of 300-800°C, under nitrogen, which the Examiner considers to be in the absence of an external gas component, in order to separate evaporable compounds from the coke remaining in a solid state, whereupon the evaporable compounds are recovered and used at the mill as process chemicals, and the coke is taken to combustion equipment for burning. The Examiner maintains that at the time of the invention, it would have been obvious to a person of ordinary skill in the art that since the spent liquor is derived from the delignification of wood, this process would occur at the pulp mill.

Applicants respectfully traverse the rejection.

Applicants initially note that the subject invention requires two separate steps comprising a pyrolysis step and a gasification step. The pyrolysis step, according to the subject application, is the chemical decomposition brought about mainly by external heat. It comprises the introduction of spent black liquor, arriving from an evaporation plant, into a pyrolysis reactor, which requires a temperature of 300-800°C, and which results in a gas and a solid being formed. Volatile compounds are separated from the coke, which remains in a solid state. Thus, the pyrolysis step of the subject invention results in both a distillate and a coke. The distillate is taken out and used elsewhere. The solid coke is transferred to a gasification reactor, which not only includes external heat at 1000-1400°C but also incorporates an external gaseous product that is introduced into the system for the reaction. Applicants note that none of the cited references alone or in combination teaches the invention of the subject application.

Applicants initially note that a proposed modification cannot render the prior art unsatisfactory for its intended purpose. MPEP 2143.01(v) citing *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The combination of Brink and Hess renders both

the references unsuitable for their intended purpose; therefore, the combination of the two references is improper.

As the Examiner has noted, Brink does not disclose that the evaporable compounds are recovered before the gasification stage. Brink expressly discloses that solid residue is collected along with the gases and is transferred to a second zone. Specifically, at Column 2, lines 71-74, of Brink, it is disclosed "to initiate a reductive pyrolysis of the material in a first zone in which indirect heat is employed and from which the material is fed to second pyrolysis and destructive distillation zone ...." Applicants note that this process does not allow for the removal of any distillate, coke, or any other product from the first zone prior to the feeding into the second zone. The Examiner maintains, however, that it would have been obvious to combine Brink with Hess, which discloses recovering the gases of pyrolysis and that the motivation to combine the two references stems from the presence of substantial amounts of dimethyl sulfide which may be recovered as a valuable by-product of the process.

A goal of Brink is to prevent formation of atmospheric pollutants in the combustion of organic material as noted at Column 1, lines 54-58, and more specifically to prevent recombination reactions of intermediate products comprising carbon free radicals to prevent formation of saturated and unsaturated aliphatic and polynuclear aromatic atmospheric pollutants. To accomplish this objective, the process of Brink comprises two steps, a distillation and a pyrolysis. Applicants point out that while the process may be carried out in two separate enclosed zones, the material from the first zone, including solids and gases, is carried in its entirety from the first zone to the second zone. At Column 3, lines 5-9, of Brink, it is stated that "[a]t the elevated temperature of the first zone, liquids, such as water, are vaporized thus leaving solid residue which together with gases are transferred to the second zone in which the pyrolysis is complete ..." (emphasis added). The Examiner, by insinuating that the steps are separable, renders Brink unsatisfactory for its intended purpose. Interrupting the process by taking out

reactive intermediate products from a first zone before the products are transferred to a second zone is counterintuitive in view of the teachings of Brink.

Modifying Brink in a manner wherein the intermediate products are removed would stifle Brink's purpose of preventing the formation of atmospheric pollutants in the combustion of organic material. As disclosed by Brink, a stable clean burning fuel can only be recovered from the second zone. Recovery of products from the first zone in Brink may lead to recombination reactions and formation of atmospheric pollutants.

Applicants note yet another distinction between the subject invention and the teachings of Hess and Brink. The two-step process of gasification and pyrolysis, as taught by the subject invention, results in two separate and distinct gases which are removed at the end of each process. As noted above, since Brink requires the use of a closed system, there is only one gaseous product that can possibly be acquired as a result of Brink's process. Hess, which only teaches a pyrolysis of spent liquor, results in a single gas as well. The products obtained as a result of the subject invention distinguish Applicants' invention from both Hess and Brink individually or in combination.

The Examiner further stated that the motivation of a skilled person for combining the teachings of Brink and Hess would have been that the gaseous products of the process contain a substantial amount of dimethyl sulfide which may be recovered as a valuable by-product of the process. Applicants note that the Brink reference is silent on dimethyl sulfide generated as a by-product of the reductive pyrolysis in the first zone. Further, Hess only reaches that dimethyl sulfide is generated under circumstances used in the process of the invention such as high pressure and low temperature. A person of ordinary skill in the art would not arrive at the subject invention by combining the teachings of Hess and Brink.

In view of the comments above and the amendments to the claims, it should be clearly appreciated that the claims herein are patentable over Brink and Hess. The teachings of DeHaas, Purdy, Hermescec, Tournier, and Hawley do not overcome the shortcomings of Brink and Hess. Since Claim 1 is free of the prior art, Claims 2-5 and 7-10, all of which depend directly or indirectly from Claim 1, should be allowable as well. Accordingly, withdrawal of the rejections and allowance of the claims is believed proper.

Reconsideration and allowance of all the claims herein are respectfully requested.

Respectfully submitted,

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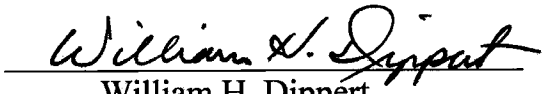

William H. Dippert
Registration No. 26,723

Wolf, Block, Schorr & Solis-Cohen LLP
250 Park Avenue
New York, New York 10177-0030
Telephone: 212.986.1116;
Facsimile: 212.986.0604
e-Mail: wdippert@wolfblock.com